

ON AN UNDESCRIBED METEORIC IRON FROM EAST TENNESSEE.

Plates IV and V.

BY F. A. GENTH.

The history of this interesting meteoric iron is very meagre. In August, 1867, I received from the late Dr. Isaac Lea a small fragment, weighing about five grams, with the request to determine whether or not it was meteoric iron. The analysis (1), finished August 11, 1867, proving it to be meteoric iron, induced Dr. Lea to purchase the specimen.

Under date of May 11, 1868, the late Julius E. Raht, of Cleveland, Tenn., wrote me: "I send you to-day a small piece (it weighed 44 grams.—F. A. G.) of meteoric iron, which was broken off from a mass, weighing fifty pounds, which *fell* about eight years ago near the State line of Georgia, ten miles from here (Cleveland, Tenn.). The piece has been sold into Mississippi."

In the fall of the year 1868, the late Dr. James L. Smith, of Louisville, Ky., the celebrated investigator of meteorites, on his return from Europe, wrote to Dr. Isaac Lea, congratulating him on the acquisition of the *Mississippi* meteorite, regretting at the same time that his absence in Europe had prevented him from securing it for his own cabinet.

It now remained in the possession of Dr. Lea, until he presented it to the Academy of Natural Sciences of Philadelphia. The Museum record of the Academy simply notes the date of its reception, on October 24, 1876, that it was from the mountains of East Tennessee, and that it weighed 254 pounds. All my efforts to obtain fuller information about its fall and discovery have proved unsuccessful.

The discrepancy between the weight given by Mr. Raht and the actual weight of the mass, must be charged to incorrect information received by Mr. Raht; this is insignificant, however, compared with the proof which Dr. Smith's letter gives to the fact that his *Mississippi* meteorite is identical with the one which Mr. Raht stated to have been sold into that State.

The mass shows on one corner the place where the 44 grams which Mr. Raht sent me had been broken off.

It is an irregularly shaped, somewhat triangular mass, the largest diameter being about 45 cm., the height about 40 cm. and its greatest thickness about 22 cm.

Its crust is very thin and mostly free from rust, only here and there covered with small spots of the same. It shows one fracture, which, however, cannot be seen on the photographic representation on Plate IV, as it is on the opposite side near the indentation, and extending for about 15 cm.; its widest part is about 10 mm. in size.

This meteoric iron appears to be an original whole mass, and not a fragment torn off from a larger one; its surface is pitted all over and shows numerous depressions and excavations, from a few centimetres in diameter and depth to about 15 cm. in length, 8 cm. in width and nearly 5 cm. in depth. The photograph shows beautifully the pitted appearance of the mass.

Its original weight was nearly 115.5 kilos.; probably 2.5 kilos. have been cut off in slabs which have been distributed amongst learned societies and individuals.

The crystalline structure of this meteorite is beautifully shown on three etched slabs which are represented in their natural size on Plate V, 1 from my cabinet, 2 in the Vaux Collection, and 3 in the general collection of the Academy of Natural Sciences. All three show the very perfect octahedral structure of this meteorite. The specimen presented to me by Mr. Raht gave on etching exactly the same crystalline structure, which adds another proof that both came from the same piece.

The usual constituents of this class of meteorites are quite perceptible: the Kamacite (Balkeneisen) largely predominating and forming bands from 1 to 3 mm. in width. The Taenite (Bandeisen) enveloping the Kamacite, frequently subdividing in narrow lines the broader bands of the latter. The length of the Kamacite individuals is from 1.5 cm. to 2 cm. It has a dull gray color; when magnified, it can be seen to be intersected in every direction by very fine lines, probably of Schreibersite. The Plesite, somewhat darker than the Kamacite, mostly shows a very fine crystalline, mottled structure (*moire metallique*) and a glittering lustre; a small portion, however, is quite dull and much darker.

On my specimen, fig. 1, Plate V, there is in two places a remarkable admixture of an iron which is a great deal smoother and hardly shows any crystalline structure. One begins about 9 mm. below the right-hand corner, first forming a somewhat oval mass of 2 to 3 mm. in diameter and then extending in a dagger-shaped

form for 7 mm.; the other is 15 mm. from the right edge and 8 or 9 mm. below the border, about 12 mm. long, on both ends 1.5 mm. and in the centre about 1 mm. wide. This iron is brighter than any other portion of the edged surface and has a slightly yellowish hue. The patches are not perfectly smooth, however, but show many very minute depressions. In the centre where this iron is narrowest and on some portion of the unetched surface of my slab, small spots of rust have made their appearance. An examination proved the presence of considerable quantity of chlorine, from which it is evident that they are the result of the oxidation of ferrous chloride, which this meteorite contains in small quantities.

The so-called "*alteration zone*" next to the *brandrind* is quite distinct and from 1 to 1.5 mm. in width.

I have made three analyses of this meteoric iron, the first nearly twenty years ago, of the slightly rusty fragment, sent by Dr. Lea (1), the second of a perfectly fresh fragment of that portion cut off for specimens (2), and the third of the carefully purified saw-dust obtained by this operation, which represents the average composition of the whole mass where it was cut (3).

They gave the following results:

| | 1. | 2. | 3. |
|--------------------|------------|--------|------------|
| Specific gravity = | | | 7.521 |
| Iron = | 88.92 | 89.940 | 89.93 |
| Copper = | 0.23 | 0.080 | 0.06 |
| Nickel = | 9.82 | 8.507 | 8.06 |
| Cobalt = | 0.77 | 0.690 | 0.56 |
| Phosphorus = | 0.19 | 0.109 | 0.66 |
| Sulphur = | not det'd. | 0.006 | not det'd. |
| | <hr/> | <hr/> | <hr/> |
| | 99.93 | 99.332 | 99.27 |